

INSTRUCTION MANUAL

Model 789A-3 Scan Controller

Serial Number: _____

— A Schoeffel Group Company —

McPHERSONTM

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NOTICE

THIS EQUIPMENT HAS BEEN CAREFULLY PACKAGED FOR SHIPMENT, AND THE TRANSPORTATION CARRIER IS RESPONSIBLE FOR DELIVERY TO YOU IN GOOD CONDITION.

If the shipment is NOT delivered in good condition and in accordance with quantity shown on the Bill of Lading or Packing Slip, note the shortage or damage on both the delivery receipt and freight bill, or use the special form provided by United Parcel Service or the Post Office.

EFFECTIVE JULY 1, 1972 the Interstate Commerce Commission has ruled that Transportation Companies will not honor any losses or damage claims unless exceptions are noted on the freight bill at the time of delivery. IT IS THE BUYER'S RESPONSIBILITY TO MAKE A COMPLETE INSPECTION IMMEDIATELY UPON RECEIPT OF PURCHASED GOODS.

If you accept shipment from the transportation carrier short of what is listed on the Bill of Lading - or in damaged condition - without having proper notation made by the Carrier, you do so at your own risk.

If bundles or crates are in apparent good order but contents are found to be damaged, call Carrier for adjuster to view same and have the Transportation Carrier/United Parcel/Post Office mark the freight bill or packing slip relative to such concealed damage.

MAKE YOUR CLAIM AT ONCE, FOR THE TRANSPORTATION COMPANY/UNITED PARCEL/POST OFFICE HAVE A LIMITED TIME FOR PRESENTATION OF CLAIMS.

We are willing to assist you in every possible manner in collecting claims for loss or damage on this shipment, but cannot be responsible for filing or collecting claims or replacing materials. Claims for Loss or Damage on shipment may not be deducted from our invoice, nor payment of the invoice be withheld awaiting adjustment of such claims, as WE CANNOT GUARANTEE SAFE DELIVERY.

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IMPORTANT NOTICE

ELECTRICAL EQUIPMENT MAY BE DANGEROUS IF NOT HANDLED WITH CAUTION. ALL INSTRUMENTS SHOULD BE OPERATED WITH PROPER GROUNDS ON POWER LINES. ELECTRICAL OR ELECTRICALLY OPERATED COMPONENTS SHOULD NOT BE EXPOSED OR HANDLED WITHOUT BEING SWITCHED OFF AND DISCONNECTED FROM THE POWER LINE.

McPHERSON WILL NOT BE RESPONSIBLE FOR ANY DAMAGE CAUSED BY SUCH UNITS IF INSTRUCTIONS HEREIN ARE NOT FOLLOWED, AND REPAIRS ARE NOT PERFORMED BY COMPANY-TRAINED OR COMPANY-LICENSED PERSONNEL.

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INSTALLATION

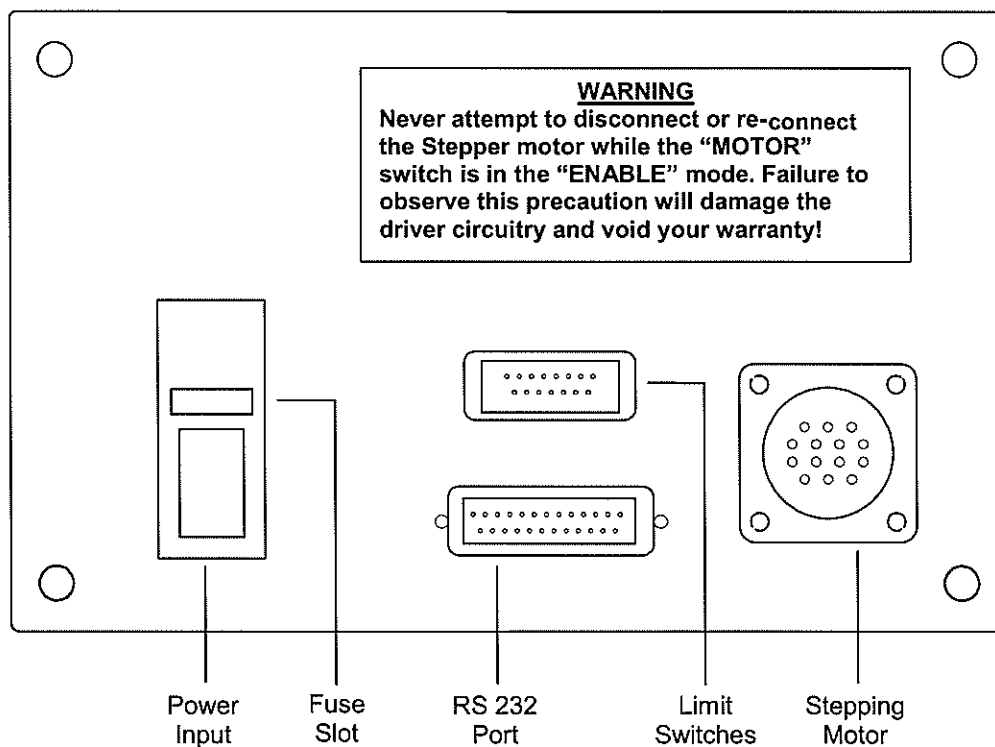
1.1 Connections

Make all connections as shown in the diagram below.

WARNING!

NEVER ATTEMPT TO DISCONNECT OR RECONNECT ANY CABLING WHILE POWER IS APPLIED.

FAILURE TO OBSERVE THIS PRECAUTION WILL DAMAGE THE DRIVER CIRCUITRY AND VOID YOUR WARRANTY!



Model 789A-3 Controller - Rear Panel

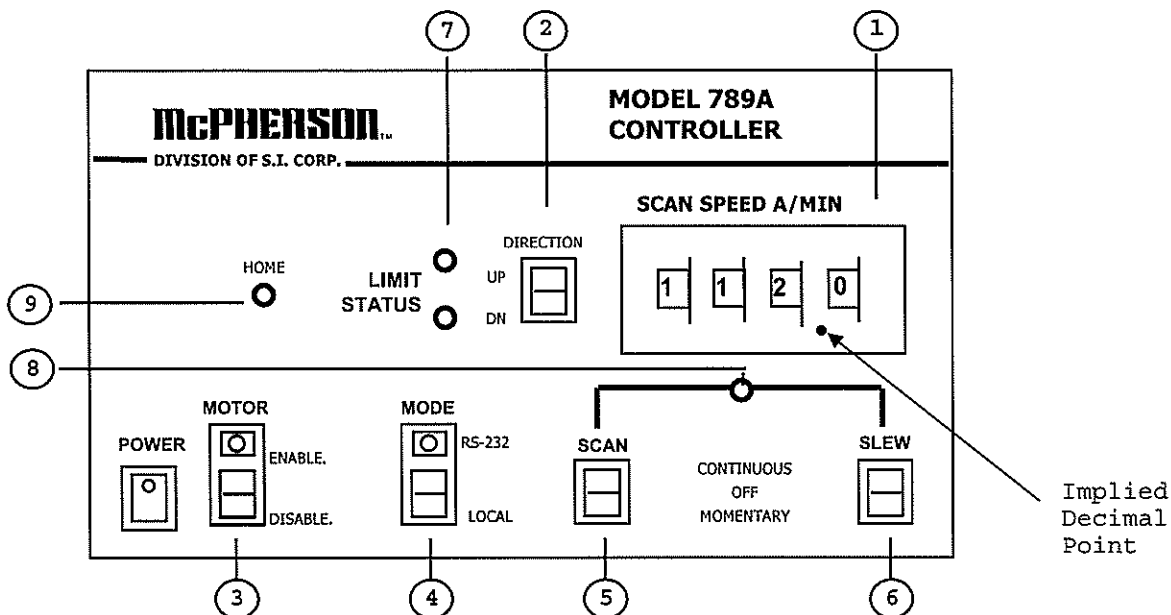
1.2 Fuse Replacement

To replace the fuse:

1. Locate and remove the fuse slot cover (see Rear Panel diagram in section 1.1.)
2. Replace with the following fuse: 2A/250V, SLO-BLO, 5 x 20mm.

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EXPLANATION OF CONTROLS



1	Scan Speed	4 position thumb wheel switch allows operator to select any scanning speed between .1 to 999.9 angstroms per minute for most instruments based on DIP Switch setting for grating selected. NOTE: Switch setting above is read as "112.0" A/Minute
2	Direction	Allows operator to select direction of "Scan" and/or "Slew".
3	Motor	Engages stepper motor when "Enabled" for scanning and disengages motor when "Disabled" if manual adjustment of wavelength is desired.
4	Mode	Selects scanning from either front panel controls or computer control via the RS232 port located on the rear panel.
5	Scan	Allows operator to continuously or momentarily scan the monochromator at scan speed selected on the thumb wheel switch.
6	Slew	Allows operator to continuously or momentarily override the scan switch, causing the motor to rotate at the maximum allowable velocity (set at factory).
7	Limit Switch Status	Dual colored LED's for high and low limits. LED will show green if limit switches are operating normally. LED will show red if limit is engaged or not connected properly.
8	Scan Status	Lights when motor is in motion from Local or RS232 operation.
9	Optional Home Switch	Lights when optionally installed "Home" switch is detected.

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GRATING SELECTION

1. Disconnect AC power from controller.
2. Remove the four screws from the top panel.
3. Remove top panel.
4. Locate the model monochromator with its grating on the table below and continuing on pages 3-2 and 3-3. Notes are explained on page 3-4.
5. Set S1 on the controller board per the table.
6. Replace the top panel and its screws.
7. Apply power to controller.

789A-3 Grating Selection Table

Monochromator model	Grating, g/mm	Motor revolutions, nm	Dip switch setting (1=ON)								Notes
			8	7	6	5	4	3	2	1	
(New lead screw) 205, 207, 209, 216.5, 218, 219, 213, 235, 2051, 2061, 2062, 2062M3	150	32	1	0	0	1	1	1	1	1	(1)
	300	16	1	0	0	1	1	1	1	1	
	600	8	0	1	0	0	1	1	1	1	
	1200	4	0	0	1	0	0	1	1	1	
	1800	2.66	0	1	0	0	1	1	1	1	(2)
	2400	2	0	0	0	1	0	0	1	1	
	3600	1.66	0	0	1	0	0	1	1	1	(3)
(Old lead screw) 205, 207, 209, 216.5, 218, 219, 213, 235, 2051, 2061, 2062, 2062M3	150	40	1	1	0	0	0	1	1	1	(1)
	300	20	1	1	0	0	0	1	1	1	
	600	10	0	1	1	0	0	0	1	1	
	1200	5	0	0	1	1	0	0	0	1	
	1800	3.33	0	1	1	0	0	0	1	1	(2)
	2400	25	0	0	0	1	1	0	0	0	
	3600	16.6	0	0	1	1	0	0	0	1	(3)

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Monochromator model	Grating, g/mm	Motor revolutions, nm	Dip switch setting (1=ON)								Notes
			8	7	6	5	4	3	2	1	
(New lead screw) 2035 (S/N 310 & above)	150	100	1	0	1	1	0	0	1	1	(4)
	300	50	1	0	1	1	0	0	1	1	(5)
	600	25	1	0	1	1	0	0	1	1	
	1200	12.5	0	1	0	1	1	0	0	1	
	1800	8.33	1	1	1	1	1	0	0	1	
	2400	6.25	0	0	1	0	1	1	0	0	
	3600	4.16	0	1	0	1	1	0	0	1	(3)
2035 (Up to S/N 309) 275D, 275	100	120	1	1	0	0	0	1	1	1	(8)
	150	80	1	1	0	0	0	1	1	1	(4)
	300	40	1	1	0	0	0	1	1	1	(5)
	600	20	1	1	0	0	0	1	1	1	
	1200	10	0	1	1	0	0	0	1	1	
	1800	6.66	1	1	0	0	0	1	1	1	(2)
	2400	5	0	0	1	1	0	0	0	1	
	3600	3.33	0	1	1	0	0	0	1	1	(3)
272 (Note 13)	570	12.5	0	0	1	1	0	0	0	1	(14)
	1140	25	0	0	0	1	1	0	0	0	
	1710	37.5	1	1	0	0	0	1	1	1	(15)
	2280	50	0	0	1	1	0	0	0	1	
225, 241 2253M5	150	20	1	1	0	0	0	1	1	1	
	300	10	0	1	1	0	0	0	1	1	
	600	5	0	0	1	1	0	0	0	1	
	1200	2.5	0	0	0	1	1	0	0	0	
	1800	1.66	0	0	1	1	0	0	0	0	(2)
	2400	1.25	0	0	0	1	1	0	0	0	(6)
	3600	0.83	0	0	1	1	0	0	0	1	(3)

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Monochromator model	Grating, g/mm	Motor revolutions, nm	Dip switch setting (1=ON)								Notes
			8	7	6	5	4	3	2	1	
X-RAY CZERNEY- TURNER (XCT)	100	12	0	1	1	1	0	1	1	1	
	150	8	0	1	0	0	1	1	1	1	
	300	4	0	0	1	0	0	1	1	1	
	600	2	0	0	0	1	0	0	1	1	
	1200	1	0	0	0	0	1	0	0	1	
	1800	0.66	0	0	0	1	0	0	1	1	(2)
	2400	0.5	0	0	0	0	0	1	0	0	
	3600	0.33	0	0	0	0	1	0	0	1	(3)
302	150	16	1	1	0	0	0	1	1	1	(1)
	300	8	1	1	0	0	0	1	1	1	
	600	4	0	1	1	0	0	0	1	1	
	1200	2	0	0	1	1	0	0	0	1	
	1800	01.33	0	1	1	0	0	0	1	1	(2)
	2400	1	0	0	0	1	1	0	0	0	
	3600	0.66	0	0	1	1	0	0	0	1	(3)
608 Pre-Disperser	N/A	10	0	1	1	0	0	0	1	1	
248/310G	ALL	0.1 inch	0	0	0	1	0	0	1	1	(7,10)
247	ALL	0.025 inch	0	0	1	1	0	0	0	1	(7,11)
Motorized slit	N/A	25 μ m	0	0	0	1	1	0	0	0	(12)

- (1) Set to 300 G/mm selection and multiply selected speed by 2.
- (2) Set to 600 G/mm selection and divide selected speed by 3.
- (3) Set to 1200 G/mm selection and divide selected speed by 3.
- (4) Set to 600 G/mm selection and multiply selected speed by 4.
- (5) Set to 600 G/mm selection and multiply selected speed by 2.
- (6) Set to 1200 G/mm selection and divide selected speed by 2.
- (7) 789A-3 motor resolution set to 18,000 steps/revolution.
- (8) Set to 600 G/mm selection and multiply by 6.
- (9) Set to 1200 G/mm selection and multiply selected speed by 2.
- (10) 789A-3 Scan Speed Setting of 1-0-0-0 = 1 inch/minute
- (11) 789A-3 Scan Speed Setting of 1-0-0-0 = 0.1 inch/minute
- (12) 789A-3 Scan Speed Setting of 1-0-0-0 = 100 Microns/min. [English Scale (25 Microns/rev.)]
- (13) Disregard implied decimal point for Model 272 ONLY.
- (14) Set to 1140 G/mm selection and multiply selected speed by 2.
- (15) Set to 1140 G/mm selection and divide selected speed by 1.5.

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OPERATION

4.1 Manual Mode

1. Set mode switch to "local".
2. Set motor switch to "enable".
3. Select direction of scan.
4. Select scan speed.

NOTE: 1000 on thumb wheel switch = 100.0 Å/min.

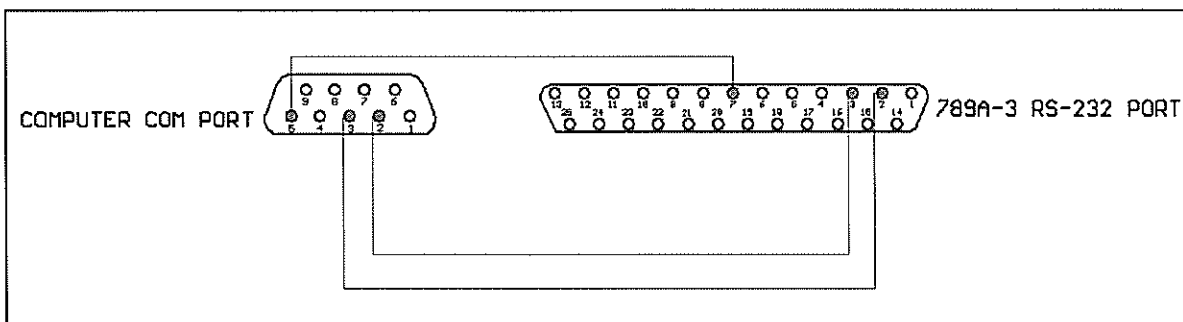
0010 on thumb wheel switch = 1.0 Å/min.

5. Place scan switch in the "continuous" position. Monochromator should be scanning at the selected speed.

6. Place scan switch in the center position when scan is completed.

4.2 Computer Mode

1. Refer to the diagram below for correct connections between the 789A-3 and the computer's COM PORT.
2. Set mode switch to "RS232." LED should light.
3. Refer to Section 5 for programming over the RS232 port.



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PROGRAMMING OVER RS232

5.1 Set-Up

1. Apply power to your computer and select a communication program such as "Hyper-Terminal". Set RS232 parameters as follows:

Boud Rate	= 9600
Parity	= None
Data Bits	= 8
Stop Bits	= 1
Flow Control	= X ON / X OFF

Press the spacebar once. If communications have been established, the serial interface will send a "sign on" message (ie: V2.53) in response to the spacebar. The message will be a software Rev. number. The 789A-3 Controller is now in "Command Mode" and ready to accept more instructions.

NOTE:

If the sign on message does not appear, check the following:

- a) Is the 789A-3 powered?
 - b) Is the RS232 cable connected to the correct COM PORT?
 - c) Are the RS232 Parameters listed earlier set properly?
 - d) The most frequent problem is the orientation of the receive (RD) and the transmit (TD) lines of the RS232 connector. For example, the 789A-3 uses a 25 pin "D-Sub" connector. The illustration in Section 4 shows the typical connection between the 789A-3 and the computer's COM PORT.
2. To calculate how many steps are required to scan from one wavelength to another:
- a) Ending wavelength (-) starting wavelength = scan distance.
 - b) Refer to the Grating Selection Table in Section 3 to determine Å/Revolution for your instrument.
 - c) Distance in steps = [wavelength distance desired / Å per motor revolution] X 36,000 steps.

EXAMPLE: For a Model 2035 Monochromator with a 1200 G/mm Grating:

To scan from 100 Å to 200 Å

1. Scan distance = 200 Å (-) 100 Å = 100 Å
2. Distance in steps = [100 Å / 100 Å per motor revolution] X 36,000 = 36,000 steps.
3. Enter "+36000" (CR).

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5.2 789A-3 Command Summary

Command			Description	Result(s)
ASCII	DECIMAL	HEX		
[SPACE]	32	20	Initialize	Enables communication with scan controller. This command must be entered first on initial power-up. If using a terminal program, pressing the "space bar" will achieve the same result. The controller will respond with its current software version.
[CR]	13	0D	Carriage Return	This command must follow all commands entered. If using a terminal program, pressing the "Carriage Return" or "Enter" key will achieve the same result.
@	64	40	Soft Stop	Causes deceleration to a stop.
^C	3	03	Reset	(1) Stops motion. (2) Sets counter to "0" (3) Assumes "Idle" state
C1	67	43	Clear	Erases pre-programmed parameters. Only use when an unexplainable scanning error has occurred.
G	103	67	Run Internal Program	Executes a program stored in non-volatile memory after entering [G] followed by the program's starting address.
I	73	49	Starting Velocity	Starting and stopping speed of scan.
K	75	4B	Ramp Slope	Acceleration /deceleration factor. Value less than 127 will result in both acceleration and deceleration having the same slope. Entering 2 values will set the acceleration slope to the first value and the deceleration slope to the second value. Range = 0-255
P	80	50	Enter & Exit Program Mode	Entering P0 through P1000 sets the 789A-3 into internal program mode. See the Programming Sample for more details.

(Continued on next page.)

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5.2 789A-3 Command Summary (continued)

Command			Description	Result(s)
ASCII	DECIMAL	HEX		
S	83	53	Save	Stores parameters to non-volatile memory. Should be used if parameters had to be re-entered after "C1" command.
V	86	56	Scanning Velocity	Sets scan speed in steps per second. Range = 36 sps to 60000 sps. (1)
X	88	58	Examine Parameters	Sends values of "K", "I", and "V" parameters. Actual values may be slightly different from entered values. This is due to internal calibration to system clock oscillator.
]	93	5D	Read Limit Switch Status	0 = No limit encountered. 32 = Home Limit Encountered. 64 = High limit encountered. 128 = Low limit encountered.
+	43	2B	Index Scan in "Up" Direction	+36000 = Scan 36000 steps in upward direction. This scan usually results in 1 motor revolution. Max. value = 8388600.
-	45	2D	Index Scan in "Down" Direction	-36000 = Scan 36000 steps in downward direction. This scan usually results in 1 motor revolution. Maximum value = 8388600.
^	94	5E	Read Moving Status	0 = No motion detected. 1 = Moving 2 = High in constant velocity. 16 = Slewing - Ramping complete.

(1) Note: See Section 5.5

5.3 Program Entry in Non-Volatile Memory

The following procedure outlines the necessary sequence of commands to store and execute a program from N.V. Memory.

Note: ASCII characters may be entered in either upper or lower case.

To enter a program, press "P" immediately followed by the starting address. It is advisable to start at address 0 the first time. This is because as the program is entered, the memory locations used for

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different length instructions are automatically assigned. As each instruction is entered and a (CR) or Enter key is pressed, the next available address appears. The difference between this address and the starting address depends on the byte size of the command. When all commands have been entered for a program, the last line must be "[address line] P (CR)". This stores the program and returns control to the command mode. The starting and ending address, together with the user assigned name of the program, should be recorded for later recall and use. To run the program, simply enter "G" immediately followed by the starting address and (CR). The program executes on the (CR) or (Enter) key.

NOTE:

If G (CR) is entered WITHOUT program Address, the program at address 0 is executed (if present.)

To view any program stored, enter "Q" (or Query) followed by the starting address, followed by (CR). To scroll through the program line by line, continue to press (CR). At the end of each program, reenter "Q" followed by the starting address to view next program. If no program resides at the next address, the # sign will appear. It then becomes necessary to enter a new "Q" or (Query) followed by the starting address of interest.

To change values in an existing program, enter "P" followed by the address line you wish to change. Enter new instruction and press (CR). To exit program mode, press (ESC) or Escape.

5.4 Erasing All or Part of N.V. Memory

There are a total of 2048 bytes in the N.V. Memory. This breaks down into 8 pages of 256 bytes per page. To erase an entire page, enter [C1] and (CR). Use [X] or [Q] (followed by program address) commands to verify removal.

IMPORTANT:

If all pages are erased, the values for K, I and V must be reentered and saved.

5.5 Calculating Velocity Parameter

To calculate motor velocity parameter:

1. Refer to Grating Selection Chart in Section 3.
2. Locate your Instrument Model and Grating .
3. Note the nM or Å per motor revolution.

Important! Once you select either nM or Å, you must stay with the your selection

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throughout the equation!

4. Unless otherwise stated in an Addendum, the standard motor resolution is 36000 Steps per revolution. (For example: your instrument is a 2061 with a 1200 G/mm Grating. The nM per revolution is 5 nM. Therefore, 5 nM = 36000 motor steps).
5. Divide your desired scan rate by the nM or Å per motor revolution determined earlier.
6. Multiply the result from Step 5 by 36000.
7. Divide the result from Step 6 by 60 to convert from motor steps per minute to pulses per second. This is the number entered after the "V" (ie: "v12000")

5.6 Sample Program

Object:	To scan the Model 207 monochromator with 1200 G/mm grating at a rate of 100 Å/min. over a range of 500Å, then change direction and slew back to starting wavelength at a rate of 50,000Å/minute. Enter P84 (CR) as shown. Note: Program line number automatically increments depending on command byte size.
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Program Entry: P84 (CR)

Program Line	Command	Description
84	V12000	12,000 steps/sec. (100Å/min.)
87	+ 360000	500Å wavelength range (360,000 steps)
93	W1000	Wait 1000 milliseconds to change velocity
96	V60000	Change V to 60,000 steps/sec. (50,000Å/min.)
98	-360000	Change direction and return 360,000 steps
102	P (CR)	Stores program, exit to command mode

Program Exit: P (CR)ADDENDUM - HOME POSITION

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ADDENDUM – HOME POSITION

6.1 Introduction

Monochromator Model Number: _____

Monochromator Serial Number: _____

Home wavelength counter reading: _____ nm

This monochromator may be equipped with a “HOME” position switch. This switch is intended only for use in a software control environment. The “Home” function is disabled in “Local” mode.

The “Home Switch” is disabled for routine scanning due to the LED portion emitting IR light, possibly causing issues in systems working in the IR. The “Home” switch is enabled by sending the ASCII command “A8” via the RS232 port to the 789A-3 Controller. After the homing procedure has completed, sending the command “A0” disables the “Home” switch.

Sending the ASCII command “A24” prepares the controller for the homing procedure. This is done after the starting position is established.

The homing procedure consists of several steps:

- 1) Determining if the current wavelength is above or below the “Home” wavelength.
- 2) Setting the wavelength to the correct starting position.
- 3) Initiating the final homing sequence.

6.2 Procedure

- 1) Apply power to 789A-3 Controller and send ASCII [Spacebar] to initialize the 789A-3 COM port.
- 2) Send the “A8” command to enable the home switch.
- 3) Send the “]” command and check the condition of bit 5.
 - (a) If Bit 5 is active, the switch is blocked and a move in the up direction is necessary. Enter the command “+720000”. Send the “]” command every 1.7 seconds (one motor revolution) until Bit 5 is clear. Once Bit 5 is clear, send the “@” command (soft stop). Enter the command “-108000” followed by “+72000”. This removes backlash in the drive system and indicates the final homing sequence starting position.
 - (b) If Bit 5 is inactive, the switch is clear and a move in the down direction is necessary. Enter the command “-720000”. Send the “]” command every 1.7 seconds (one motor revolution) until Bit 5 is active. Once Bit 5 is active, send the “@” command (soft stop). Enter the command “-108000” followed by “+72000”. This removes backlash in the drive system and indicates the final homing sequence starting position.
- 4) Send the commands “A24” followed by “F1000,0” to start the final homing sequence. The 789A-3 will begin to scan in a downward direction at a slow rate of speed. Once the home switch is detected, all motion stops and the yellow “Home” LED will light.
- 5) Send the command “A0” and begin normal scanning.

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Appendix

Warranty and Assistance, Warranty Exceptions, and Returning Goods

Warranty and Assistance

McPherson products are warranted to be free from defects in material and workmanship and conform to the specifications furnished by the company at date of delivery. The company's obligation under this warranty is limited to servicing, adjusting, or repairing or replacing any McPherson made part or parts thereof, returned to the factory or in the field. Shipping or travel expenses to be prepaid by customer both ways. Items manufactured by McPherson carry a warranty of one year. Purchased items carry the original manufacturer's guarantee where available.

McPherson shall not be liable for consequential damages resulting from accidents, alterations, misuse, improper installation, handling by improperly qualified personnel, operation on low or excessive voltages, or any use in violation of operating instructions furnished by the company.

If any defect appears upon receipt, the purchaser shall promptly notify the company. No material will be accepted for repair or replacement without prior authorization from the company. (See instructions for returning goods on page A-3.) Upon such authorization and in accordance with instructions from the company, parts, materials or equipment for which repair or replacement is requested shall be returned to the company for examination, or be examined in the field. Shipping and/or travel charges will be quoted and must be prepaid by the purchaser. Final determination as to whether a product or part is actually defective rests with the company.

For parts not subject to warranty or after lapse of warranty period, an estimate of repair charges will be submitted to the customer before servicing the equipment.

The company reserves the right to make changes or improve its products and will supply such replacement where available without imposing upon itself the obligation to supply the same in lieu of its product(s) previously offered and/or manufactured.

This warranty is in lieu of all other obligations or liabilities expressed or declared on the part of the company. The company neither assumes, nor authorizes any other person to assume for them, other obligations or liability in connection with the sale of equipment manufactured by McPherson.

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Warranty Exceptions

The warranty will not apply in case of any misuse, neglect of instructions and violations of the policy. Furthermore, the performance of systems assembled by the customer which incorporate McPherson parts, supplies or instruments is not covered by this warranty. The following indicate other exceptions to the one year warranty.

Parts and Supplies — Optics, photomultipliers, MCP PDA, CCD, and other detectors, light sources, fuses, rubber products (i.e. o-rings, gaskets), quartz capillaries and any other items that can be damaged by misuse, overexposure and/or are of expendable nature will not be warranted unless received defective or destroyed by the malfunctioning of warranted components.

Obvious Abuse — Components or assemblies that require replacement or repair due to obvious abuse or unauthorized repair attempts will not be subject to or considered a warranted item.

This certifies that Model 789A3, S/N 666 carries a limited warranty of one year from date of delivery, with above limitations and terms.

This certifies that Model , S/N carries a purchased * second year of limited warranty beginning one year after the original date of delivery, with above limitations and terms.

Cynthia Rhoads 12/17/10

*Additional warranties and / or service subject to written quotations and purchase orders.

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Returning Goods

Please observe the following procedure when returning goods:

Obtain a return material authorization (RMA) number from McPherson. This number must appear on the outside of the package returned.

1. For WARRANTY repairs obtain an RMA Number.

This return material authorization number must appear on the outside of the package and on all documents and packing slips, etc. A description of the problem and/or repairs needed should be enclosed and the information should include the purchase date, the original purchase order number, McPherson job number and invoice number (if possible). The serial number must be included.

2. For NON-WARRANTY repairs obtain a JOB number.

A purchase order for defect evaluation in the amount of \$250.00 has to be issued. This should be done before returning the instrument or the purchase order must accompany the instrument.

After completion of the evaluation, McPherson will provide a quotation detailing the cost of needed repairs and shipping.

Thereafter, McPherson will expect to receive a purchase order for the amount quoted. The evaluation charge will be credited against this amount. Upon receipt of the purchase order, work will commence.

3. Return the goods, shipping and insurance prepaid, to:

If possible,
send to the attention of
Contact Person.

McPherson Inc.
7A Stuart Road
Chelmsford, MA 01824

RMA or JOB #:

ATTN: _____

4. If the return shipment comes from outside the USA, the following additional information should be on all paperwork as well as on the outside of the package. To avoid possible customs charges.

- a) USA Made Equipment
- b) NOT FOR SALE
- c) Submitted for repair/service
- d) To Be Returned